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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/002,974	10/26/2001	Gabriel Nunez	UM-06646	3481

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EXAMINER

GOLDBERG, JEANINE ANNE

ART UNIT	PAPER NUMBER
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1634

DATE MAILED: 11/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/002,974	NUNEZ ET AL.	
	Examiner	Art Unit	
	Jeanine A Goldberg	1634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 September 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9,11,12,24-31 and 33-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9,11,12,24-31 and 33-37 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10/26/01 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>0903</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This action is in response to the papers filed September 16, 2003. Currently, claims 1-9, 11-12, 24-31, 33-37 are pending.
2. All arguments have been thoroughly reviewed but are deemed non-persuasive for the reasons which follow. This action is made FINAL.
3. Any objections and rejections not reiterated below are hereby withdrawn.

Election/Restrictions

4. Applicant's election without traverse of Group I in Paper No. 8 is acknowledged.

It is noted that applicant's have now elected a single sequence or single SNP within the scope of the claims for prosecution. As noted in the earlier action, "In the event that applicant's amend the claims, the examiner reserves the right to impose the restriction upon any newly presented claims." Since the response only inserted a single mutation, namely 3020insC, the examiner has examined the 3020insC mutation as elected by applicant.

Specification

5. Upon examination of the newly amended claims, the following objections were identified. The disclosure is objected to following comparison of the figures. The specification asserts that SEQ ID NO: 1 and 33 differ in that SEQ ID NO: 33 contains an insertion of a C at position 3020. However, the figures contains these sequences are both 4485 nucleotides in length. SEQ ID NO: 33 in the sequence listing is 4486

nucleotides. Appropriate correction of the drawings is required to correspond with the sequence listing.

6. Upon close comparison of SEQ ID NO: 1 and 33, the sequences appears to differ in an insertion of a C at location 3122 of SEQ ID NO: 33. This does not appear to correspond to the specification which teaches a mutation at 3020 (Table 1, page 64). Appropriate correction is required.

Priority

7. This application claims priority to provisional applications 60/244,266, filed October 30, 2000 and 60/286,316, filed April 25, 2001.

It is noted that the provisional filed in October 30, 2000 only appears to teach a single variation within the scope of the claims, namely an insertion of C which results in the truncation of the protein.

New Matter and Written Description Rejections

8. Claim 34 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In the amended claims, reference to "at least 33 c-terminal amino acids" are included. The amendment proposes that the new claim language is supported by page 56, lines 1-13 and Examples 4-10. Figure 13 depicts the Nod2 Amino acid wild type.

Figure 15, SEQ ID NO: 34 depicts the Nod2a Amino acid truncation 33. The specification allegedly describes truncation mutants of Nod2 and assays for screening Nod2 truncation mutants for activity. However, the specification does not describe or discuss "at least 33 c-terminal amino acids". Instead the specification describes a single truncation mutant (SEQ ID NO: 3)(page 56). The specification fails to make any statement that "at least 33 c-terminal amino acids" are contemplated or in possession of the applicants. At the time the invention was described in the instant specification, the specification does not appear to contemplate larger than 33 amino acid truncations. There is no indication that the specification had possession or contemplated deletion of 34, 35, 60, 70, or 75 amino acids, for example. The concept of "at least 33 c-terminal amino acids" does not appear to be part of the originally filed invention. Therefore, "at least 33 c-terminal amino acids" constitutes new matter.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112-Description

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

9. Claims 1-9, 11-12, 24-31, 33 and Newly added Claims 34-37 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The claims are drawn to a method of identifying subjects at risk of developing Crohn's disease by detecting the presence or absence of one or more variations in a Nod2 gene.

The specification teaches specific examples which have sequenced a Nod2 gene on chromosome 16q12. The genomic organization of the Nod2 gene was 12-exons (page 118). The specification teaches amplifying all coding exons and flanking introns in DNA samples from CD individuals (page 118, lines 25-32). A cytosine insertion was observed in exon 11 at nt 3020 (page 118, lines 30-31). The insertion resulted in a frameshift at the second nucleotide of codon 1007. Figure 26 illustrates 7 additional polymorphisms that were identified in Nod2 gene (page 124). The specification teaches a significant association between Nod2 33, G908R, and R702W with Crohn's disease (page 125-126). As seen in Table 3, each of the p-values for these polymorphisms is less than 0.05.

Moreover the post filing date art establishes that the Nod2 gene was discovered by three independent groups. In addition to the publication by Ogura et al (Nature, Vol. 411, pages 60-3606, May 2001), Hampe et al (The Lancet, Vol. 357, pages 1925-1928, June 16, 2001) and Hugot et al. (Nature, Vol. 411, pages 599-603, May 2001) teach mutations in Nod2 and Crohn's disease association.

Hampe et al. (herein referred to as Hampe) teaches screening for mutation in Nod2 by genomic resequencing or denaturing high-performance liquid chromatography. The analysis yielded 12 mutations including a C-insertion mutation in exon 11. Hampe

teaches that the C insertion mutation was significantly significant at a p-value of <0.0001 .

Hugot et al. (herein referred to as Hugot) teaches the identification of Nod2 mapped to chromosome 16. In Figure 1, multiple SNPs are identified pictorially in the Nod2 gene. Moreover, Table 1 provides each of the SNPs, their location and the association studies with Crohn's disease. When comparing the table to the SNPs identified in the instant application, it appears as though four of the mutations are in common. For example, SNP5 of Hugot appears to correspond to SNP4 of the instant application.

	Hugot Table	Significance in Hugot	Instant Application	Significance in instant application
P268S/P214S	SNP5	0.0001	SNP4	Not determined
R675W/R702W	SNP8	0.001	SNP20	0.0010
G1881R/G908R	SNP12	0.003	SNP17	0.00010
2936insC/ Nod2	SNP13	0.000006	C ins	0.0018
33				

Of the additional SNPs provide by Hugot, four of the 13 are not significant. The instant specification is silent with respect to the significance of any of the additional SNPs within the instant application.

The French document of Hugot also provides additional variant nucleotides within the Nod2 gene. There appear to be approximately 24 variations taught within Table 3 on page 36-37. The table provides the exons within the Nod2 gene in which each of the markers occurs, the position of the variant nucleotide, the position in the variant protein, the frequency in individuals with Crohn's disease, and finally in the last column, the presence of the mutation in normal individuals.

There is not adequate description of the genus of variations within the scope of the claims. The specification has only taught seven single nucleotide polymorphisms and one insert polymorphism within the Nod2 gene. Variations is a very broad term which has not been explicitly defined in the specification. Variations within nucleotide sequences encompass not only single nucleotide polymorphisms and insertions, but also mutations, translocations, microsatellite markers, trinucleotide repeat regions, etc. The description of 8 of these variations is not a representative number. Therefore, the description of these 8 markers are not representative of the genus as a whole. Based upon the post filing date art, at the time the invention was made, a representative number of marker within the scope of the claim was not disclosed. It is clear that the specification had not described the 11 additional markers taught by Hugot. Moreover, in the French document by Hugot, additional markers have been taught which were not disclosed in the instant application. There is substantial variability among the species of nucleic acids encompassed in the scope of the claim because only two specific mutations have been identified in the gene with 12 exons. The specification has also not defined a structural feature of the variations which would be common to all members

of the genus that constitutes a substantial portion of the genus. Furthermore, one of skill in the art would conclude that applicant was not in possession of the claimed "variation in the Nod2 gene" because the description of only eight members of this genus is not representative of the variants of the genus and is insufficient to support the claims. Thus, the specification does not adequately provide a written description for variants in Nod2.

Moreover, with respect to "variations which result in increased NF-B activation," "cytosine residue insertion," "mutation which causes a deletion of a least one LRR repeat of Nod2" (Claims 7-9) the specification has described a single mutation within the scope of the claims. The specification has not described a representative number of mutations which insert a cytosine residue, increase NF-B activation or cause a deletion of at least one LRR repeat of Nod2.

With respect to Claim 34, the specification does not describe or discuss "at least 33 c-terminal amino acids". Instead the specification describes a single truncation mutant (SEQ ID NO: 3)(page 56). The specification fails to make any statement that "at least 33 c-terminal amino acids" are contemplated or in possession of the applicants. At the time the invention was described in the instant specification, the specification does not appear to contemplate larger than 33 amino acid truncations. There is no indication that the specification had possession or contemplated deletion of 34, 35, 60, 70, or 75 amino acids, for example.

With respect to Claim 35-37, the specification describes a single variation which results in the deletion of 33 c-terminal amino acids of a peptide encoded by Nod2 gene.

The specification describes an insertion of 3020inC. This single mutation is not representative of all possible mutations or variations which may results in the deletion of 33 c-terminal amino acids of a peptide encoded by Nod2. Further, the claims have been amended to specification claim an 3020 insC. The specification asserts that SEQ ID NO: 1 and 33 differ in that SEQ ID NO: 33 contains an insertion of a C at position 3020. However, the figures contains these sequences are both 4485 nucleotides in length. SEQ ID NO: 33 in the sequence listing is 4486 nucleotides. Moreover, upon close comparison of SEQ ID NO: 1 and 33, the sequences appears to differ in an insertion of a C at location 3122 of SEQ ID NO: 33. This does not appear to correspond to the specification which teaches a mutation at 3020 (Table 1, page 64).

Response to Arguments

The response traverses the rejection. The response asserts that applicants have disclosed a representative number of Nod2 variants. This argument has been reviewed but is not convincing because the postfiling date art supports the size of the genus was much larger than disclosed by the instant specification. Thus, a representative number of variations has not been disclosed. Moreover, the general knowledge in the art concerning alleles or variations does not provide any indication of how the structure of one allele is representative of unknown alleles. The nature of alleles is that they are variant structures, and in the present state of the art the structure of one does not provide guidance to the structure of others. The common attributes of the genus are not described. One of skill in the art would conclude that applicant was not in possession of the claimed genus because a description of 8 members of the genus is not

representative of the variants of the genus and is insufficient to support the claim (see Written Description Guideline Example 11). Thus for the reasons above and those already of record, the rejection is maintained.

Claim Rejections - 35 USC § 112-Scope of Enablement

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

10. Claims 1-9, 11-12, 24-31, 33 and Newly added Claims 34-37 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Factors to be considered in determining whether a disclosure meets the enablement requirement of 35 USC 112, first paragraph, have been described by the court in *In re Wands*, 8 USPQ2d 1400 (CA FC 1988). *Wands* states at page 1404,

“Factors to be considered in determining whether a disclosure would require undue experimentation have been summarized by the board in *Ex parte Forman*. They include (1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims.”

The claims are broadly drawn to a method of identifying subjects at risk of developing Crohn's disease by detecting the presence or absence of one or more variations in a Nod2 gene.

The specification teaches specific examples which have sequenced a Nod2 gene on chromosome 16q12. The genomic organization of the Nod2 gene was 12-exons (page 118). The specification teaches amplifying all coding exons and flanking introns in DNA samples from CD individuals (page 118, lines 25-32). A cytosine insertion was observed in exon 11 at nt 3020 (page 118, lines 30-31). The insertion resulted in a frameshift at the second nucleotide of codon 1007. Figure 26 illustrates 7 additional polymorphisms that were identified in Nod2 gene (page 124). The specification teaches a significant association between Nod2 33, G908R, and R702W with Crohn's disease (page 125-126). As seen in Table 3, each of the p-values for these polymorphisms is less than 0.05.

Moreover the post filing date art establishes that the Nod2 gene was discovered by three independent groups. In addition to the publication by Ogura et al (Nature, Vol. 411, pages 60-3606, May 2001), Hampe et al (The Lancet, Vol. 357, pages 1925-1928, June 16, 2001) and Hugot et al. (Nature, Vol. 411, pages 599-603, May 2001) teach mutations in Nod2 and Crohn's disease association.

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Nod2 gene. Moreover, Table 1 provides each of the SNPs, their location and the association studies with Crohn's disease. When comparing the table to the SNPs identified in the instant application, it appears as though four of the mutations are in common. For example, SNP5 of Hugot appears to correspond to SNP4 of the instant application.

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The French document of Hugot also provides additional variant nucleotides within the Nod2 gene. There appear to be approximately 24 variations taught within Table 3 on page 36-37. The table provides the exons within the Nod2 gene in which each of the markers occurs, the position of the variant nucleotide, the position in the

variant protein, the frequency in individuals with Crohn's disease, and finally in the last column, the presence of the mutation in normal individuals.

Neither the art nor the specification enable the skilled artisan to make and use the claimed invention as broadly as claimed. First, the specification asserts that the instant invention discovered the Nod2 gene. It is not well known in the art the scope of Nod2 gene. Therefore, aside from the few Nod2 genes discussed in the specification by SEQ ID NO:, the ordinary artisan would be unable to ascertain what constitutes a Nod2 gene. The Nod2 gene does not have any functional activity, in which the ordinary artisan would be able to assay for to reasonably confirm that the nucleic acid examined is in fact a Nod2 gene. Thus, absent some structural information, the skilled artisan would be unable to identify a gene by the arbitrary gene name Nod2.

Moreover, the teachings in the specification do not establish that one could actually detect the presence of any variation in the Nod2 gene as an indicator of developing Crohn's disease. Rather the teachings in the specification demonstrate that the presence of three specific variations within the gene are associated with an increase risk of Crohn's disease. In the absence of guidance from the specification, one skill in the art may look to the teachings of the prior art for enablement of the claimed invention. However, the prior art also provides numerous variations within the scope of the claims which have been demonstrated not to have an association with Crohn's disease. As seen in Hugot, approximately four of the markers studied failed to have any association with Crohn's disease. Moreover, in Hugot's foreign document, Table 3 illustrates that several of the mutations are found more frequently in normal individuals than in Crohn's

patients or that the variation is found in neither of the populations. Thus, it is unpredictable as to whether one could successfully use the full scope of the claimed invention. While one could conduct additional experimentation to find additional variations within the Nod2 gene and to determine whether an association exists between the newly discovered variation and Crohn's disease, the outcome of such research cannot be predicted, and such further research and experimentation are both unpredictable and undue. Claims 2-4 appear to be directed solely to research projects to determine whether unknown and undescribed variations within the Nod2 gene are associated with Crohn's disease. The ordinary artisan would use the steps to perform the additional experimentation that is deemed necessary to perform the entire scope of these claims.

The method relies on detecting the presence or absence of mutations to identify subjects at risk of developing Crohn's disease. The absence of a mutation in Nod2 has not been demonstrated to be indicative of a lack of Crohn's disease. The art teaches (Hugot- French document) that the mutations are present in normal individuals, but there is a significant difference between the presence of the mutation in Crohn's disease patients and normal individuals. Therefore, the claims would be more properly drawn to detecting the presence of the variation as indicative of Crohn's disease.

Moreover, with respect to "variations which result in increased NF-B activation," "cytosine residue insertion," "mutation which causes a deletion of a least one LRR repeat of Nod2" (Claims 7-9) the specification has taught a single mutation within the scope of the claims. The skilled artisan would be required to perform undue and

unpredictable experimentation to determine whether any additional variations within the scope of the claims insert a cytosine residue, increase NF-B activation or cause a deletion of at least one LRR repeat of Nod2.

With respect to Claim 34, the specification does not describe or discuss "at least 33 c-terminal amino acids". Instead the specification describes a single truncation mutant (SEQ ID NO: 3)(page 56). The specification fails to make any statement that "at least 33 c-terminal amino acids" are contemplated or in possession of the applicants. At the time the invention was described in the instant specification, the specification does not appear to contemplate larger than 33 amino acid truncations. There is no indication that the specification had possession or contemplated deletion of 34, 35, 60, 70, or 75 amino acids, for example.

With respect to Claim 35-37, the specification describes a single variation which results in the deletion of 33 c-terminal amino acids of a peptide encoded by Nod2 gene. The specification describes an insertion of 3020inC. This single mutation is not representative of all possible mutations or variations which may results in the deletion of 33 c-terminal amino acids of a peptide encoded by Nod2. Further, the claims have been amended to specification claim an 3020 insC. The specification asserts that SEQ ID NO: 1 and 33 differ in that SEQ ID NO: 33 contains an insertion of a C at position 3020. However, the figures contains these sequences are both 4485 nucleotides in length. SEQ ID NO: 33 in the sequence listing is 4486 nucleotides. Moreover, upon close comparison of SEQ ID NO: 1 and 33, the sequences appears to differ in an

insertion of a C at location 3122 of SEQ ID NO: 33. This does not appear to correspond to the specification which teaches a mutation at 3020 (Table 1, page 64).

Response to Arguments

The response traverses the rejection. The response asserts the specification provides an activity of Nod2 and an assay for the activation of NF- κ B. This argument has been reviewed but is not convincing because the specification has described a single variation which results in increased NF-B activation. The specification does not teach nor assert that all variations which increase NF-B activation increase risk of Crohn's disease, nor are the claims so limited. Thus, the skilled artisan would be required to determine whether each variation is associated with Crohn's disease which is unpredictable and undue experimentation as explained in the rejection above.

With respect to Claim 34-36, the specification asserts that the instant invention discovered the Nod2 gene. It is not well known in the art the scope of Nod2 gene. Therefore, aside from the few Nod2 genes discussed in the specification by SEQ ID NO:, the ordinary artisan would be unable to ascertain what constitutes a Nod2 gene. The Nod2 gene does not have any functional activity, in which the ordinary artisan would be able to assay for to reasonably confirm that the nucleic acid examined is in fact a Nod2 gene. Thus, absent some structural information, the skilled artisan would be unable to identify a gene by the arbitrary gene name Nod2. Thus for the reasons above and those already of record, the rejection is maintained.

Conclusion

11. No claims allowable.

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Jeanine Goldberg whose telephone number is (703) 306-5817. The examiner can normally be reached Monday-Friday from 8:00 a.m. to 5:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Jones, can be reached on (703) 308-1152. The fax number for this Group is (703) 305- 3014.

Any inquiry of a general nature should be directed to the Group receptionist whose telephone number is (703) 308-0196.

J. Goldberg
Jeanine Goldberg
November 7, 2003

Jehanne Souaya
JEHANNE SOUAYA
PATENT EXAMINER
Primary
11/7/03